

## **General Overview of Technical Analysis Conclusion**

### Conclusion

Extensive confining clay layers and direction of localized groundwater flow preclude water from inside the Aquifer Exemption (AE) Boundary from reaching the Braquet Well and the Church Wells (Numbers 26 and 27). Following is a summary explaining this conclusion. In-depth technical details leading to this conclusion are provided the accompanying documents titled:

Responses (A through E)

Responses to Items A and B Table 1

Responses to Items A and B Table 2

Response to Item D Table

Water Level Contour Maps

### I. Vertical Confinement

As shown in the various cross-sections that UEC provided Region 6, and which were part of the Mine Permit Application, extensive confining clay layers (aquitards) are present throughout and beyond the AE area. The aquitards restrict vertical migration of groundwater within and beyond the AE area. In particular, three of the previously submitted cross-sections (C-C□, A□-Up-17-3, and A-A□) verify the continuation of discrete sands that are capped above and below by thick clays beyond the AE area.

In addition to the cross-sections that were submitted Dr. William Galloway, a renowned Texas geologist and leading expert on the geology of the South Texas Uranium Province, stated during the contested case hearing:

“The portion of the Goliad Formation located in Goliad County was deposited by a large, ancient river known as the Cuero River.... Because the Cuero River was meandering, it formed broad, tabular deposits that are typically thirty to sixty feet thick, thousands of feet to tens of thousands of feet wide and tens of miles long.”

He further stated:

“The clay layers are widespread sheets that extend across and beyond the Mine Permit Area. This would be expected in fluvial deposits where flood plains cover much larger areas than do channel fills.”

A copy of Dr. Galloway’s Direct Testimony was previously submitted.

## II. Groundwater Flow

As can be seen in the attached B sand water level contour maps, groundwater flow in the localized area is from west to east. These maps are computer generated (using the Kriging method for gridding) from the water level surveys conducted in September 2008, March 2010, February 2012 and September 2012. These contours represent lines of equal water level elevation. The maps show that groundwater flows west to east (perpendicular to the contour lines) moving in the direction of decreasing water level elevation.

Groundwater flow in the graben (between the two faults) is about 15.3 feet per year and the direction of flow is from west to east. Because the new Braquet well and Church wells are south of the AE Boundary and because they draw water from the west these wells cannot capture water from the AE area which is to the north. Even if one were to dismiss the fact that the graben causes water to flow from west to east, the time required for the capture zones of the Braquet and Church wells, which are known to be in Sand A, to reach the revised Sand A AE Boundary would be approximately 204 years and 255 years, respectively.

The reason why the localized (between the two faults) groundwater flow rate is only approximately 15.3 feet per year is attributed to the much reduced gradient in the graben. The Northwest Fault acts as a barrier to the regional groundwater flow, thus reducing the gradient inside the graben.